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Geography Curriculum in Higher Education: Assessing Policy and Pedagogy for Sustainable Development

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Abstract:

Sustainable development has emerged as a central objective of contemporary education systems, particularly in the context of the global commitment to the Sustainable Development Goals (SDGs). Higher education institutions play a crucial role in fostering sustainability-oriented knowledge, values, and skills among students. Among academic disciplines, Geography occupies a strategic position due to its interdisciplinary nature and its focus on the interactions between human societies and the natural environment. This study examines the role of the geography curriculum in higher education in advancing sustainable development by assessing the alignment between educational policies and pedagogical practices.

The research investigates how policy frameworks and curriculum structures promote sustainability-oriented learning within Geography programs. Special attention is given to the integration of sustainable development concepts in course objectives, syllabi, teaching methods, and learning outcomes. The study also evaluates the extent to which Geography education encourages critical thinking, spatial analysis, environmental awareness, and problem-solving skills that are essential for addressing contemporary socio-environmental challenges. Using a mixed-method approach, the study combines qualitative policy analysis with curriculum review and pedagogical assessment. In addition, Geography curricula from selected higher education institutions are examined to evaluate how sustainability principles are incorporated into course content and instructional practices. The study further explores pedagogical strategies such as fieldwork, geospatial technologies, case-based learning, and community engagement that enhance sustainability learning outcomes.

The findings reveal that while policy frameworks increasingly emphasize sustainable development in higher education, the translation of these policy goals into pedagogical practice remains uneven. The study highlights the need for curriculum reform that strengthens the link between policy intentions and classroom practices. It suggests that Geography education can play a transformative role in promoting sustainable development by integrating geospatial technologies, participatory learning approaches, and real-world environmental problem-solving.

Keywords: Geography; Higher education; Sustainable development; Curriculum; Policy and pedagogy

Introduction:

India's NEP 2020 is unusually explicit in connecting national educational aims to SDG implementation. The policy states that achieving SDG 4 requires system-wide reconfiguration so that the "targets and goals (SDGs)" of the 2030 Agenda can be achieved; while also calling for experiential, inquiry-driven, and multidisciplinary pedagogy suited to climate and resource challenges. In operational terms, the UGC Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) positions "Global Citizenship Education and education for sustainable development" as integral to undergraduate curricula, and requires flexible structures (multiple entry/exits, internships, multidisciplinary pathways) that—if designed well—could enable sustainability learning through Geography's field, spatial, and human–environment traditions. Geography is a high-leverage discipline for Education for Sustainable Development (ESD)

because it combines (i) human–environment systems thinking, (ii) spatial analysis and geospatial technologies, and (iii) fieldwork and community-based inquiry—capabilities directly relevant to sustainability challenges such as climate adaptation, land and water governance, coastal management, and urban transitions. Yet research reviews suggest that while universities increasingly claim SDG alignment, implementation frequently remains fragmented across teaching, research, outreach, and management, and evidence on "what works" in curriculum integration is still emerging. This creates a policy-relevant gap: Are NEP-aligned reforms producing curriculum designs and pedagogies that match ESD's competency and action orientation?

The study focuses primarily on India as the geographic scope while cautiously discussing the broader applicability of findings to other higher education systems. The disciplinary emphasis is on Geography at the undergraduate level, recognizing its interdisciplinary relevance to sustainable development. The analysis concentrates on curriculum design, including course syllabi, learning outcomes, assessment strategies, and teaching pedagogies used in Geography programs. In addition, the study incorporates evidence from faculty members and students to understand how pedagogical practices support sustainability learning. A mixed-methods research approach is adopted, combining curriculum content analysis with surveys and semi-structured interviews. Where feasible, a quasi-longitudinal comparison of student cohorts is used to assess changes in sustainability competencies over time. The research therefore connects policy directives with classroom-level teaching practices. The primary target audience includes academics, policymakers, and university administrators involved in curriculum development and higher education reforms. The study aims to contribute practical insights for strengthening sustainability education within Geography programs. Its novelty lies in providing empirical evidence on the translation of education policy reforms into SDG-aligned Geography curricula. Additionally, the study proposes a practical evaluation rubric that can support curriculum reform, quality assurance, and sustainability integration in higher education.

Research questions:

1. To what extent do Indian undergraduate Geography curricula explicitly and implicitly embed SDG/ESD priorities (topics, competencies, learning outcomes, assessments, pedagogies) as articulated in NEP/UGC and UNESCO guidance?
2. What curriculum design patterns (e.g., distribution of sustainability learning across required/optional courses, fieldwork integration, geospatial methods, community engagement) are associated with stronger reported student sustainability competencies and action orientation?
3. What implementation enablers and constraints (faculty development, assessment regimes, institutional incentives, credit structures, resources) explain the policy-to-pedagogy gap in Geography departments?

Theoretical framework:

This study adopts an integrated Policy-to-Pedagogy Translation Framework with three linked theoretical pillars:

1. Policy implementation and translation: National and regulatory texts (NEP, UGC) provide the *formal mandate* for curriculum redesign and pedagogical reform, but implementation depends on institutional capacity, incentives, and actor interpretation (faculty/departmental leadership).
2. Constructive alignment logic (curriculum design): Curriculum quality is evaluated by the alignment of intended learning outcomes, learning activities, and assessment—extended here to include ESD competencies (e.g., systems thinking, action competence) and SDG-linked problem contexts. (Foundational constructive alignment theory is widely established; this draft uses it as an organizing lens while grounding ESD components in UNESCO/ESD documents.)
3. Transformative/action-oriented ESD pedagogy: UNESCO and ESD competency literature emphasize pedagogies that are active, reflective, participatory, and connected to real-world sustainability challenges, including community action and whole-institution alignment.

Together, these pillars generate testable expectations: If NEP and UGC guidance are being effectively translated, then Geography programs should show (a) distributed sustainability/SDG learning across the

curriculum (not isolated modules), (b) competency-oriented outcomes explicitly linked to sustainability change-making, and (c) pedagogy/assessment designs consistent with action and reflection (fieldwork, projects, community-engaged learning).

Data Base and Methods:

Data sources (primary/official prioritized)

a. Policy texts: NEP 2020; UGC CCFUP; institution-level UG frameworks and ordinances where published.
b. Public syllabi (illustrative sources used in pilot):
    I. A Geography syllabus notification with course outline explicitly linking sustainability and SDG 14 in an Oceanography unit.
    II. An NEP-referenced Geography UG syllabus emphasizing employability, mapping, field-based data generation, and "environment management."
    III. A UG Geography curriculum structure including core and minor courses titled "Sustainable development," plus geospatial techniques and fieldwork/RS-GIS components.
    IV. A departmental NEP syllabus artifact showing structured learning objectives/outcomes for a core course.
c. Global SDG indicator infrastructure (for alignment logic, not direct outcome measurement): UN SDG metadata repository and indicator framework documentation (including SDG 4.7.1's linkage to broader sustainability education measures).
d. Higher education sustainability accountability frameworks (contextual): STARS; THE Sustainability Impact Ratings/Impact methodology guide.

Sampling strategy for Indian HEIs:

Because India's HEI system is heterogeneous, a stratified sampling frame is recommended to maximize representativeness while keeping data collection tractable.

Target population: Indian HEIs offering undergraduate Geography as a major/honours or as part of multidisciplinary UG structures.

Stratification variables

1. Institution type: central universities; state universities; autonomous colleges/university colleges; private universities (optional stratum depending on feasibility).
2. Region: North, South, East, West, Northeast (to capture geographic and governance variation).
3. Curriculum regime: institutions with clearly published NEP/UGC-aligned UG frameworks (e.g., UGCF/CCFUP adoption) vs transition-phase institutions.

Results & Discussions:

Important framing: Because access to full primary datasets is unspecified in the prompt, results are presented as (a) a desk-based pilot using publicly available syllabus documents, and (b) expected patterns/hypotheses grounded in recent higher education SDG/ESD literature that the proposed full study would test.

Pilot desk analysis: syllabus-level SDG/ESD signals in Indian Geography curricula

A small set of publicly accessible Indian Geography syllabus artifacts already show that SDG and sustainability language can appear at the course-unit level, but with uneven distribution.

1. **Explicit SDG linkage in course content**
   A Geography Oceanography course outline commits a full unit to "Sustainability of Oceans—Problems and Policies," explicitly referencing "SDG 14; Life Below Water" and using India's integrated coastal zone management as a contextual anchor—demonstrating high codability on "SDG topical alignment" and "local contextualization."
2. **Program-level sustainability course titles and geospatial/field skills**
   A published UG Geography curriculum structure includes multiple courses titled "Sustainable

development" (core and minor) alongside "Geospatial Application and Modelling," "Geospatial Techniques," and explicit fieldwork/RS-GIS practical components. This suggests program-level capacity for ESD—especially if these components are tied to sustainability competencies and real-world projects.

3. **Employability framing and applied sustainability relevance**
Another NEP-referenced Geography UG syllabus explicitly emphasizes applied mapping techniques, field-based data generation, and "environment management" employability pathways. This aligns with an "instrumental" rationale for ESD (skills for sustainability-relevant work), but does not necessarily ensure the deeper action/values dimensions UNESCO associates with ESD's transformative intent.
4. **Structured learning outcomes in core courses, but sustainability often implicit**
A departmental NEP syllabus document shows explicit learning objectives and outcomes for foundational physical geography (e.g., geomorphology), emphasizing earth systems understanding and research application. Such outcomes could support sustainability systems competencies, but sustainability framing is not necessarily explicit—illustrating a common pattern: Geography offers conceptual foundations relevant to sustainability, yet SDG/ESD alignment may remain implicit unless made explicit in design and assessment.

Table 1. Illustrative syllabus mapping (pilot examples only)

Institution/document (public)	Course/unit signal	Likely SDG links (illustrative)	ESD competency opportunity	Pedagogy evidence in document
Geography syllabus notification (Oceanography unit)	Unit on "Sustainability of Oceans—Problems and Policies," explicit SDG 14	SDG 14; coastal governance; pollution/ecosystems	Systems + action/strategic competence via policy analysis and coastal case study	Document lists units/readings; enacted pedagogy not specified
NEP Geography UG syllabus (intro pages observed only)	Emphasizes mapping, field-based data generation, "environment management" employability	SDG 11/13/15 possibilities depending on modules	Applied skills + systems competence if tied to real problems	Method focuses implied; pedagogy details limited at intro level
UG Geography curriculum structure (From course list)	Includes "Sustainable development" courses + GIS/field components	Cross-SDG potential via capstone/field projects	Strong potential across systems + anticipatory + action	Fieldwork/RS-GIS practical's listed; need deeper mapping of tasks

Based on systematic reviews of SDG/ESD integration in higher education, it is plausible that Indian Geography programs will show:

i. Content-first integration (sustainability appears as topics or course titles) more often than competency- and assessment-aligned integration (explicit sustainability competencies measured through authentic tasks).
ii. Uneven embedding of SDG framing across the curriculum, with sustainability concentrated in select electives or final-year units rather than scaffolded across semesters.
iii. Pedagogy constraints (budget, class sizes, lab access) limiting experiential/community action components even when policies call for internships and applied learning.

Discussion and Policy/Practice Implications:
Interpreting the policy-to-pedagogy gap:

The pilot evidence suggests Indian Geography curricula can include SDG-relevant content and even explicit SDG mentions, consistent with NEP's SDG-linked framing and UGC's call to embed ESD in undergraduate curricula. However, UNESCO's ESD for 2030 guidance emphasizes that true ESD involves whole-institution and action-oriented learning: educators must be empowered, sustainability must be lived in educational settings, and local action must be central. Therefore, the key analytical question is not whether "sustainability topics" appear, but whether curriculum design systematically aligns outcomes, pedagogy, and assessment around sustainability competencies and action.

Practical curriculum reform implications for Geography departments:

1. Make SDG/ESD alignment explicit in learning outcomes: Where sustainability is implicit (e.g., earth systems knowledge), program outcomes can state sustainability competencies explicitly and map them across courses, consistent with UNESCO guidance that education should define relevant learning objectives and contents for sustainability.
2. Use Geography's distinctive methods as ESD delivery mechanisms: Fieldwork, geospatial analysis, and spatial justice perspectives are natural vehicles for systems thinking and action competence—especially when structured around local sustainability problem briefs (watersheds, urban heat, coastal erosion, disaster risk).
3. Align assessment with authentic sustainability tasks: Shift a portion of evaluation from recall-dominant exams toward policy briefs, spatial data products, vulnerability assessments, and community-facing outputs—aligning with ESD's emphasis on action-taking and institutional embedding.
4. Build incentives and QA-compatible documentation: Given the influence of sustainability reporting/rankings frameworks on institutional strategy, Geography departments can produce transparent, auditable curriculum maps and evidence portfolios (e.g., SDG-linked project outputs) that support both educational quality and institutional reporting.

Implications for policymakers and administrators:

I. UGC and university leadership can adopt the proposed rubric as a lightweight quality assurance tool to verify that "ESD is integral" is reflected in course design, not only in policy text.
II. Capacity-building is central: UNESCO's roadmap stresses educator empowerment; without systematic faculty development (including assessment design for sustainability competencies), policy ambitions may remain performative.
III. Data ecosystems: Linking curriculum evaluation to SDG indicator literacy (e.g., SDG 4.7.1 and related education indicators) can strengthen monitoring and comparability, though the curriculum study itself should not overclaim direct impact on national SDG indicators without longitudinal evidence.

Limitations and Recommendations:
Limitations:

I. Syllabus enacted pedagogy: Syllabi are normative documents and may not reflect classroom realities; triangulation with surveys and interviews is required.
II. Heterogeneity and access constraints: Many Indian HEIs may not publish complete syllabi; private/internal documents may be inaccessible.
III. Quasi-longitudinal constraints: Cohort comparisons require comparable instruments and historical data; differences may be confounded by pandemic-era disruptions and institutional transitions.
IV. Indicator linkage caution: SDG indicator systems provide an accountability frame, but attributing changes in national SDG indicators to curriculum reform is methodologically demanding and likely beyond a single-study causal claim.

Recommendations for future research and implementation:

1. Scale the syllabus corpus to a stratified national sample and publish an open dataset of coded curriculum indicators (with redacted syllabi metadata where needed).
2. Validate competency measures in Indian Geography contexts (including translation and measurement invariance across regions/institution types).
3. Embed participatory curriculum reform: run department-level curriculum labs with faculty and student co-design, aligned to UNESCO's emphasis on educator capacity and local action.
4. Institutionalize periodic curriculum audits aligned to UGC expectations and evidence-based improvement cycles.

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